CLAIMS

1. An air conditioning system (A1) for cooling or heating an air, and for feeding the heated or cooled air to predetermined portions, characterized by comprising:

a first circulating circuit (B1) for circulating a first heating medium;

a second circulating circuit (C1) for circulating a second heating medium;

a first heat exchanger (18) for executing heat exchange between the first and second heating mediums; and

a second heat exchanger (25) for executing heat exchange between first and second heating mediums.

2. The air conditioning system (A1) according to Claim 1, characterized by further comprising:

a third heat exchanger (8), which is different from the first heat exchanger in heat exchange characteristics between the first and second heating mediums, and which is communicated in series with the first heat exchanger;

a selector (27) for selectively flowing the second heating medium through the first heat exchanger (18) or through the third heat exchanger (8); and

a controller (33) for executing a switching operation of the selector (27) on the basis of an air conditioning demand.

3. The air conditioning system (A1) according to Claim 2, characterized in that:

the controller (33) includes a means for executing a switching operation of the selector (27) so as to flow the second heating medium through any one of the first heat exchanger (18) and the third heat exchanger (8), which is more excellent in heat exchange characteristics than the other, in case the air conditioning demand is high.

4. The air conditioning system (A1) according to Claim 2, characterized:

in that the first heat exchanger (18) comprises a first flow passage for flowing the first heating medium, and a second flow passage formed adjacent to and in parallel with the first flow passage and for flowing the second heating medium; and

in that a flowing direction of the first heating medium in the first flow passage and a flowing direction of the second heating medium in the second flow passage are opposite to each other.

5. The air conditioning system (A1) according to Claim 1, characterized:

by further comprising a first heat storing device (8) having a heat storing material (14) which is heated or cooled by the first heating medium, for executing the heat exchange among the first heating medium, the second heating medium and the heat storing material (14); and

in that second circulating circuit (C1) comprises a first circuit for flowing the second heating medium through the first heat exchanger (18); a second circuit for flowing the second heating medium through the first heat storing device (8); and a selector (27) for communicating the second heat exchanger (25) selectively to the first circuit and the second circuit.

6. The air conditioning system (A1) according to Claim 5, characterized:

in that the first heat exchanger (18) is arranged in an upstream side of the first heat storing device (8) in a flowing direction of the low-temperatured first heating medium; and

in that the selector (27) executes a switching operation to flow the second heating medium into the first heat exchanger (18) through the first circuit in case the rapid cooling

is demanded, and executes a switching operation to flow the second heating medium into the first heat storing device (8) through the second circuit in case the normal cooling is demanded.

7. The air conditioning system (A1) according to Claim 5, characterized in that:

a second heat storing device (9) having a heat storage material (14) which receives heat from the heated and high-temperatured first heating medium and stores the heat therein is arranged in the first (circulating) circuit.

8. The air conditioning system (A1) according to Claim 7, characterized by further comprising:

a heat source mechanism (1, 4, 6) for heating and cooling the first heating medium; and

a controller (33) for operating the heat source mechanism, in case the temperature of the heat storage material (14) in at least any one of the heat storing devices (8, 9) is at a predetermined value or lower, and air conditioning is demanded.

9. The air conditioning system (A1) according to Claim 7, characterized by further comprising:

a controller (33) which operates the first (circulating) circuit (B1) in accordance with a temperature of at least any one of the heat storing devices (8, 9), and which operates the second (circulating) circuit (C1) in accordance with the air temperature.

10. The air conditioning system (A1) according to Claim 9, characterized:

by further comprising a pump (28) for pressurizing and flowing the second heating medium; and

in that the controller (33) comprises a means for controlling an output of the pump (28) on the basis of a deviation between the air temperature and the target temperature at a predetermined position in the outlet side of the second heat exchanger (25).

11. The air conditioning system (A1) according to Claim5 or 7, characterized in that:

any of the first heat storing device (8) and the second heat storing device (9) comprises a pipe penetrating the heat storage material (14) for flowing the first heating medium or the second heating medium therethrough, and a plurality of fins (13) embedded in the heat storage material (14) and integrated with the pipe (28).

12. The air conditioning system (A1) according to Claim 7, characterized in that:

the second heat storing device (9) is arranged in an upstream side of the first heat storing device (8) in a flowing direction of the heated and high-temperatured first heating medium.

13. The air conditioning system (A1) according to Claim 7 or 12, characterized by further comprising:

a fourth heat exchanger (26) for executing heat exchange selectively with the air; and

a third circuit (D1) for circulating a third heating medium between the second heat storing device (9) and the fourth heat exchanger (26), and for providing heat to the third heating medium in the second heat storing device (9).

14. The air conditioning system (A1) according to Claim 7, characterized in that:

a compressor (1) for pressurizing the first heating medium, a heat radiator (4) for

radiating heat from the first heating medium, and an expander (6) for adiabatically expanding the pressurized first heating medium, are connected in series with the first heat exchanger (18) and the first heat storing device (8).

15. The air conditioning system (A1) according to Claim 14, characterized:

by further comprising a determining device (33) for determining permission and non-permission of operation of the compressor (1) on the basis of the temperature of the heat storage material (14) in any one of the heat storing devices (8, 9); and

in that a hysteresis is set to the permissible temperature and non-permissible temperature of operation of the compressor (1).

16. The air conditioning system (A1) according to Claim 14, characterized:

by further comprising a thawing device (33, Step S616) for heating the first heat storing device (8) temporarily; and

in that the first heat storing device (8) stores energy for cooling, and the second heat storing device (9) stores heat for heating.

17. The air conditioning system (A1) according to Claim 16, characterized by further comprising:

a vehicle mounting the air conditioning system thereon; and

wherein the thawing device (33, Step S616) comprises a means for setting the amount of heat for heating the first heat storing device (8) on the basis of at least any one of a road information on which the vehicle is running, weather around the vehicle, a vehicle speed, an engine speed, outside temperature, an amount of heat necessary to air conditioning the room.

18. The air conditioning system (A1) according to Claim 14, characterized by further comprising:

a prime mover (51) for outputting a power for running the vehicle and for driving the compressor (1); and

a controller (33, Step S618) for selecting a pre-heat storing mode, in which heat is stored in the heat storing device or radiated by driving the compressor (1) by a running inertia force, when the prime mover (51) is driven compulsorily by the running inertia force.

19. The air conditioning system (A1) according to Claim 14, characterized by further comprising:

a selector valve (17) for switching the flowing direction of the first heating medium, into a direction from the compressor (1) through the heat radiator (4) and the expander (6) to the first heat storing device (8), and into a direction from the heater (1) through the first heat storing device (8) and the expander (6) to the heat radiator (4).

20. The air conditioning system (A1) according to Claim 19, characterized in that:

the second heat storing device (9), which receives heat from the first heating medium and stores the heat therein, is arranged between a discharging port of the compressor (1) and the selector valve (17).

21. The air conditioning system (A1) according to Claim 20, characterized by further comprising:

a fourth heat exchanger (26) for executing heat exchange selectively with the air; and

a third (circulating) circuit (D1) for circulating a third heating medium between

the second heat storing device (9) and the fourth heat exchanger (26), and for providing heat to the third heating medium in the second heat storing device (9).

22. The air conditioning system (A1) according to Claim 7, characterized by further comprising:

an airmix executing means (D1, 26) for providing heat of the second heat storing device (9) to the air cooled by the second heat exchanger (25), thereby heating the air.

23. The air conditioning system (A1) according to Claim 7, characterized by further comprising:

any of an internal combustion engine (51) and a drive unit having oil; and

a controller (33) for providing heat stored in the second heat storing device (9) to any one of the internal combustion engine (51) or the drive unit, thereby executing either warming up of the internal combustion engine (51) or heating of the oil.

24. The air conditioning system (A1) according to Claim 23, characterized by comprising:

a means for warming up the internal combustion engine (51) by the heat of the second heat storing device (9), while the internal combustion engine (51) is halted.